

CLAIMS

What is claimed is:

1. A supply device to circulate a fluid through a flow system, comprising:
 - a control unit having a control housing defining a first enclosed channel formed in a wall of said control housing and in heat exchange relationship with a first cooling fluid flowing therethrough;
 - a drive unit that communicates with said control unit, said control unit controlling operation of said drive unit; and
 - a supply unit that is driven by said drive unit and induces fluid flow through said flow system.
2. The supply device of claim 1 wherein said control unit includes a controller that generates heat.
3. The supply device of claim 1 wherein said first cooling fluid draws heat from said control unit.
4. The supply device of claim 1 wherein said drive unit further comprises a drive housing defining a second channel in heat exchange relationship with a second cooling fluid flowing therethrough.

5. The supply device of claim 4 wherein said drive unit generates heat that is drawn from said drive unit by said second cooling fluid.
6. The supply device of claim 4 wherein said second cooling fluid is a liquid.
7. The supply device of claim 4 wherein said second cooling fluid is a gas.
8. The supply device of claim 1 wherein said drive unit includes an electric motor having a shaft interconnected to said supply unit.
9. The supply device of claim 1 wherein said supply unit includes a supply housing defining a third channel in heat exchange relationship with a third cooling fluid flowing therethrough, said third cooling fluid drawing away heat generated by said supply unit.
10. The supply device of claim 9 wherein said third cooling fluid is a liquid.

11. The supply device of claim 1 wherein said supply unit is a compressor comprising:

an impeller;

a suction that is connected to said flow system, said impeller drawing a fluid from said flow system into said supply unit through said suction;
and

a discharge that is connected to said flow system, said impeller pushing fluid from said supply unit into said flow system through said discharge.

12. The supply device of claim 1 wherein said first cooling fluid is a liquid.

13. A supply device to circulate a flow of hydrogen through a fuel cell system, comprising:

a control unit having a control housing defining a first enclosed channel in heat exchange relationship with a first cooling fluid flow;

a drive unit having a drive housing defining a second channel in heat exchange relationship with a second cooling fluid flow, said control unit controlling operation of said drive unit; and

a compressor unit that is driven by said drive unit and induces hydrogen flow through said fuel cell system.

14. The supply device of claim 13 wherein said first cooling fluid is a liquid.

15. The supply device of claim 13 wherein said second cooling fluid is a liquid.

16. The supply device of claim 13 wherein said second cooling fluid is a gas.

17. The supply device of claim 13 wherein said control unit includes a controller that generates heat.

18. The supply device of claim 13 wherein said cooling fluid flowing through said first channel draws heat from said control unit.

19. The supply device of claim 13 wherein said drive unit includes an electric motor having a shaft interconnected to said compressor unit.

20. The supply device of claim 13 wherein said compressor unit includes a supply housing defining a third channel in heat exchange relationship with a third cooling fluid, said third cooling fluid drawing away heat generated by said compressor unit.

21. The supply device of claim 20 wherein said third cooling fluid is a liquid.

22. The supply device of claim 13 wherein said compressor unit comprises:

an impeller;

a suction that is connected to said fuel cell system, said impeller drawing hydrogen from said fuel cell system into said compressor unit through said suction; and

a discharge that is connected to said fuel cell system, said impeller pushing hydrogen from said compressor unit into said fuel cell system through said discharge.

23. The supply device of claim 13 wherein said control unit is mounted to said drive housing, said control unit in heat exchange relationship with said second cooling fluid flow.

24. The supply device of claim 13 wherein said drive unit defines a fourth channel in heat exchange relationship with a fourth cooling fluid flow.

25. A fuel cell system including a hydrogen flow circuit, comprising:
a supply device circulating hydrogen through said hydrogen flow circuit, said supply device comprising:
a control unit having a control housing defining a first enclosed channel in heat exchange relationship with a first cooling fluid flowing therethrough;
a drive unit that communicates with said control unit, said control unit controlling operation of said drive unit; and
a supply unit that is driven by said drive unit and induces hydrogen flow through said hydrogen flow circuit; and
a fuel cell stack that receives said hydrogen flow.
26. The fuel cell system of claim 25 wherein said first cooling fluid is a liquid.
27. The fuel cell system of claim 25 wherein said first cooling fluid draws heat from said control unit.
28. The fuel cell system of claim 25 wherein said drive unit further comprises a drive housing defining a second channel in heat exchange relationship with a second cooling fluid flowing therethrough.

29. The fuel cell system of claim 28 wherein said drive unit generates heat that is drawn from said drive unit by said second cooling fluid.

30. The fuel cell system of claim 28 wherein said second cooling fluid is a liquid.

31. The fuel cell system of claim 28 wherein said second cooling fluid is a gas.

32. The fuel cell system of claim 25 wherein said drive unit includes an electric motor having a shaft interconnected to said supply unit.

33. The fuel cell system of claim 28 wherein said control unit is attached to said drive housing, said control unit in heat exchange relationship with said second cooling fluid flow.

34. The fuel cell system of claim 25 wherein said supply unit includes a supply housing defining a third channel in heat exchange relationship with a third cooling fluid flowing therethrough, said third cooling fluid drawing away heat generated by said supply unit.

35. The fuel cell system of claim 34 wherein said third cooling fluid is a liquid.

36. The fuel cell system of claim 25 wherein said supply unit is a compressor comprising:

an impeller;

a suction that is connected to said hydrogen flow circuit, said impeller drawing a fluid from said hydrogen flow circuit into said supply unit through said suction; and

a discharge that is connected to said hydrogen flow circuit, said impeller pushing fluid from said supply unit into said hydrogen flow circuit through said discharge.

37. The fuel cell system of claim 25, wherein said drive unit further comprises a drive housing defining a second channel in heat exchange relationship with a second cooling fluid flowing therethrough and a third channel in heat exchange relationship with a third cooling fluid flowing therethrough.

38. The fuel cell system of claim 37 wherein said second cooling fluid is a liquid.

39. The fuel cell system of claim 37 wherein said third cooling fluid is a gas.